



Biomass Research and Development Technical Advisory Committee Meeting

UTenn Economic Data

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25x'25 Initiative

- Renewable energy initiative born in the ag and forestry sectors
- Supported by the Energy Future Coalition
- Seeks to forge consensus on a new energy future
- Focuses on economic, national security and environmental benefits



25x'25 Vision:

By the year 2025, America's farms, ranches and forests will provide 25 percent of the total energy consumed in the U.S. from renewable resources while continuing to produce safe, abundant and affordable food, feed and fiber.

25x'25



Univ. of Tennessee Study Objectives

- Determine the ability of America's farms, forests and ranches to provide 25% of U.S. total energy needs in 2025
- Assess the economic impacts of achieving the 25x'25 goal on the ag sector and the overall economy



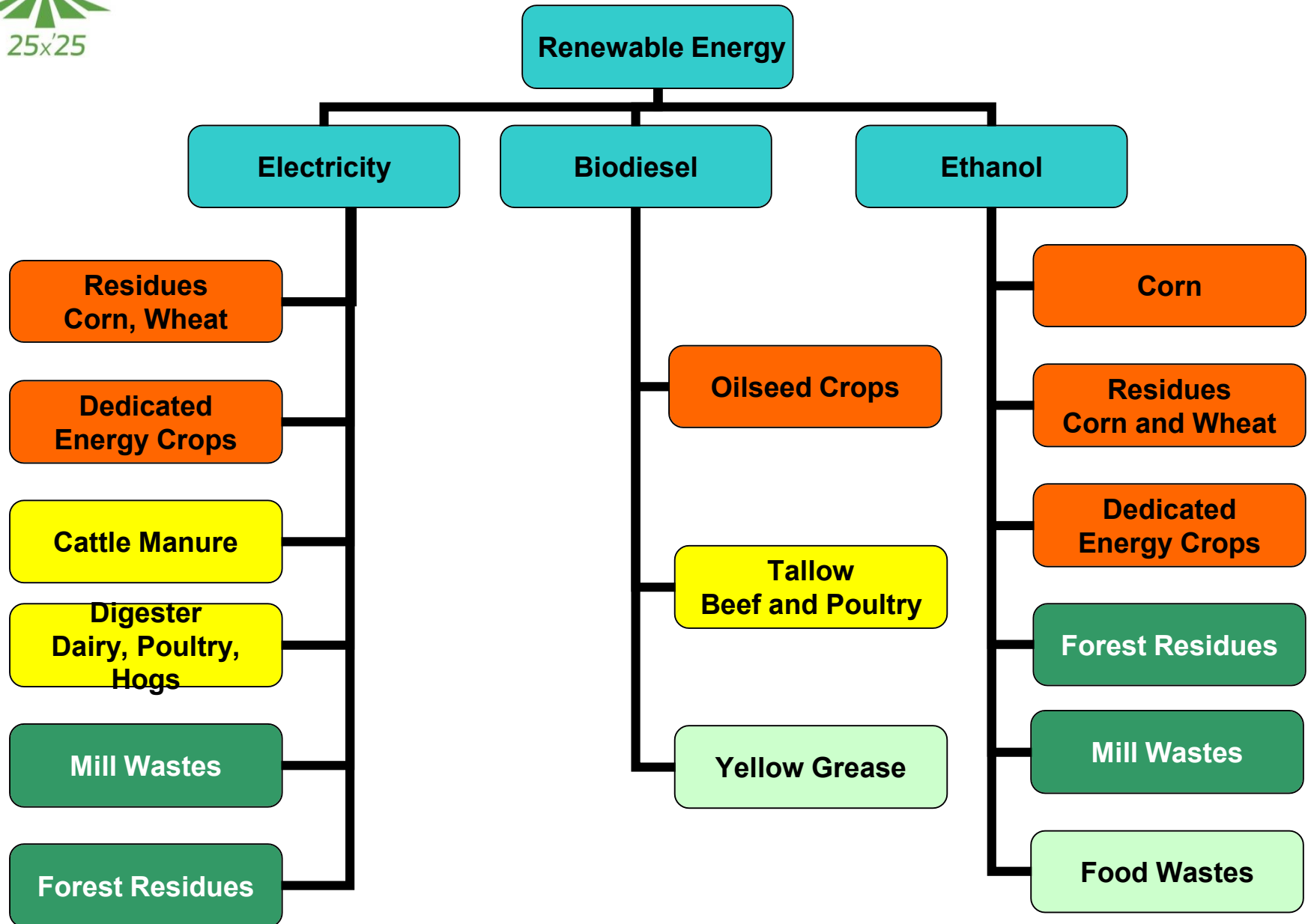
Two Scenarios Examined

- **AE:** 25% of *all energy* consumed
 $117.7 \text{ quads} \times 25\% = \mathbf{29.4 \text{ quads}}$
- **EPT:** 25% of *electric power and transportation*
 $81.62 \text{ quads} \times 25\% = \mathbf{20.4 \text{ quads}}$



Energy Contributions from the Land

- 25% goal (AE) 29.42 quads
- geothermal, hydro, solar photovoltaic, and wind generation - 13.97 quads
- From biomass resources 15.45 quads





Forage Lands

- The analysis operates under an assumption that this nation has underutilized forage lands.
- Therefore, a conservative assumption is added:
 - *An additional acre of hay land is required for every 2 acres of pastureland converted to dedicated energy crop production.*



Study Results

- America's farms, forests and ranches can play a significant role in meeting the country's energy needs.
- The 25x'25 goal can be met while continuing to provide safe, abundant and affordable food, feed and fiber.

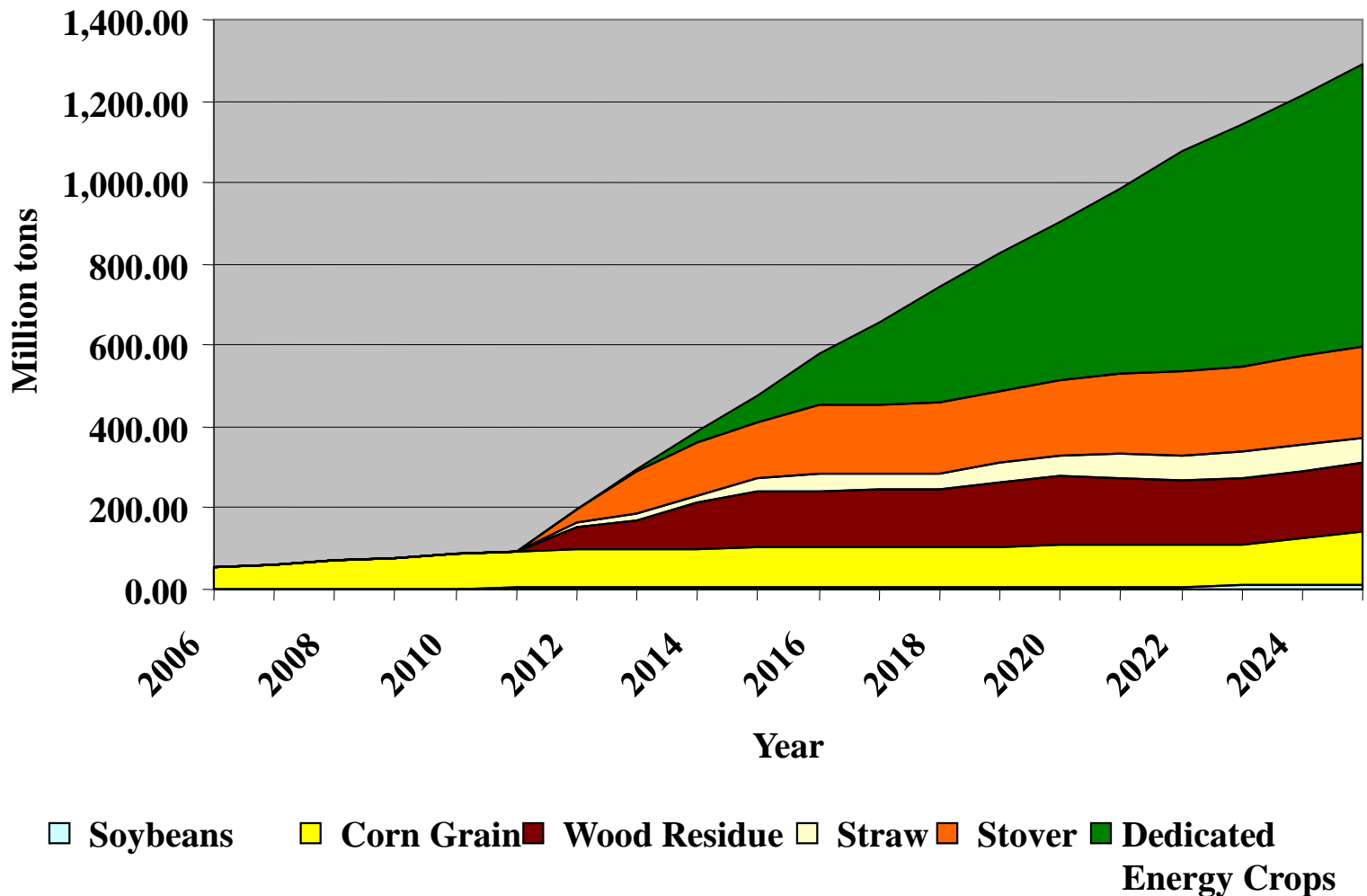


By 2025, America's farms, forests and ranches can annually produce:

- 86 billion gallons of ethanol
- 1.1 billion gallons of biodiesel
- 932 billion kwh of electricity
- 15.45 quads of energy from biomass

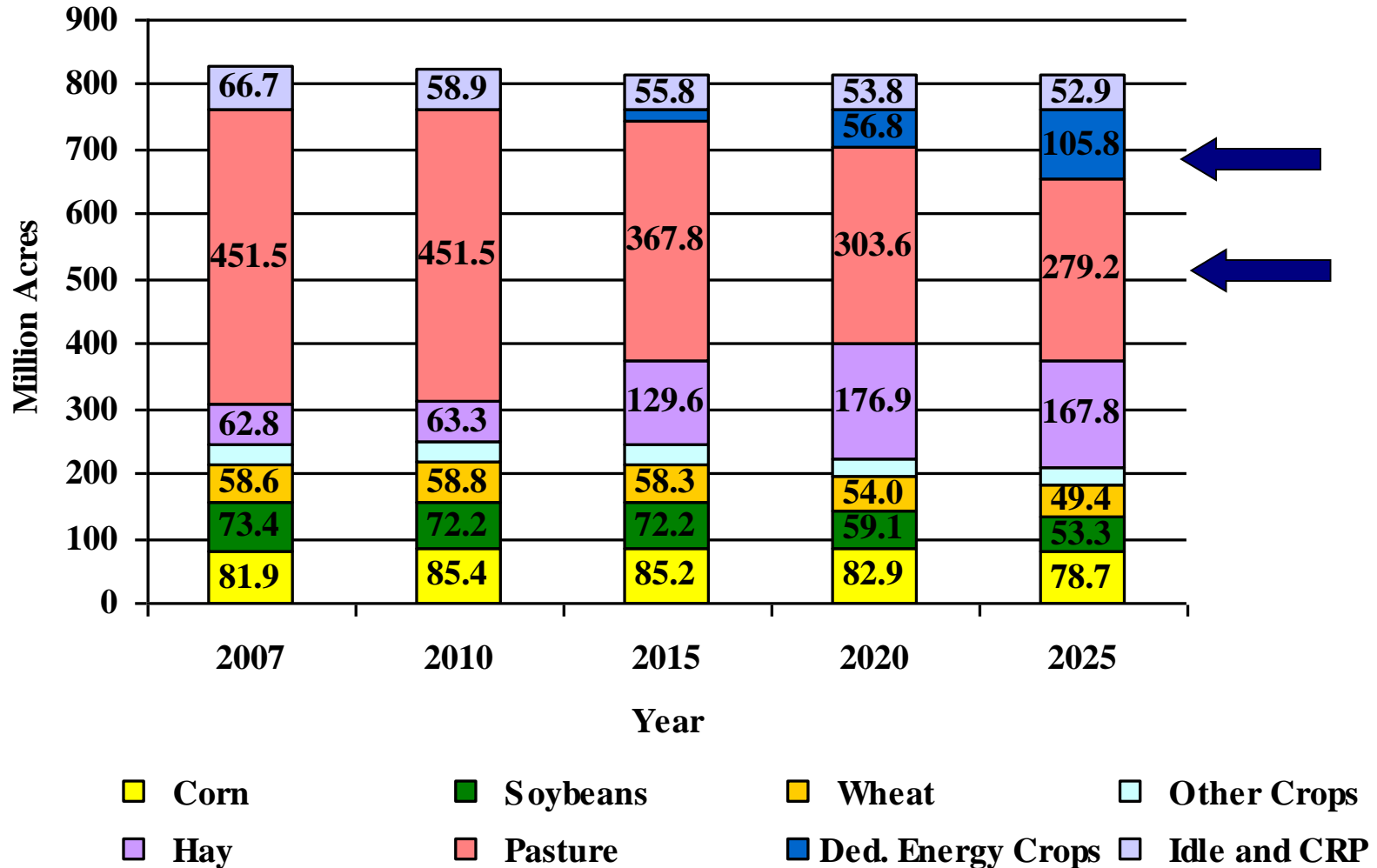


Feedstocks Used in Attaining the AE Goal





Changes in Land Use: **AE** Scenario.





Impacts on Livestock Industry

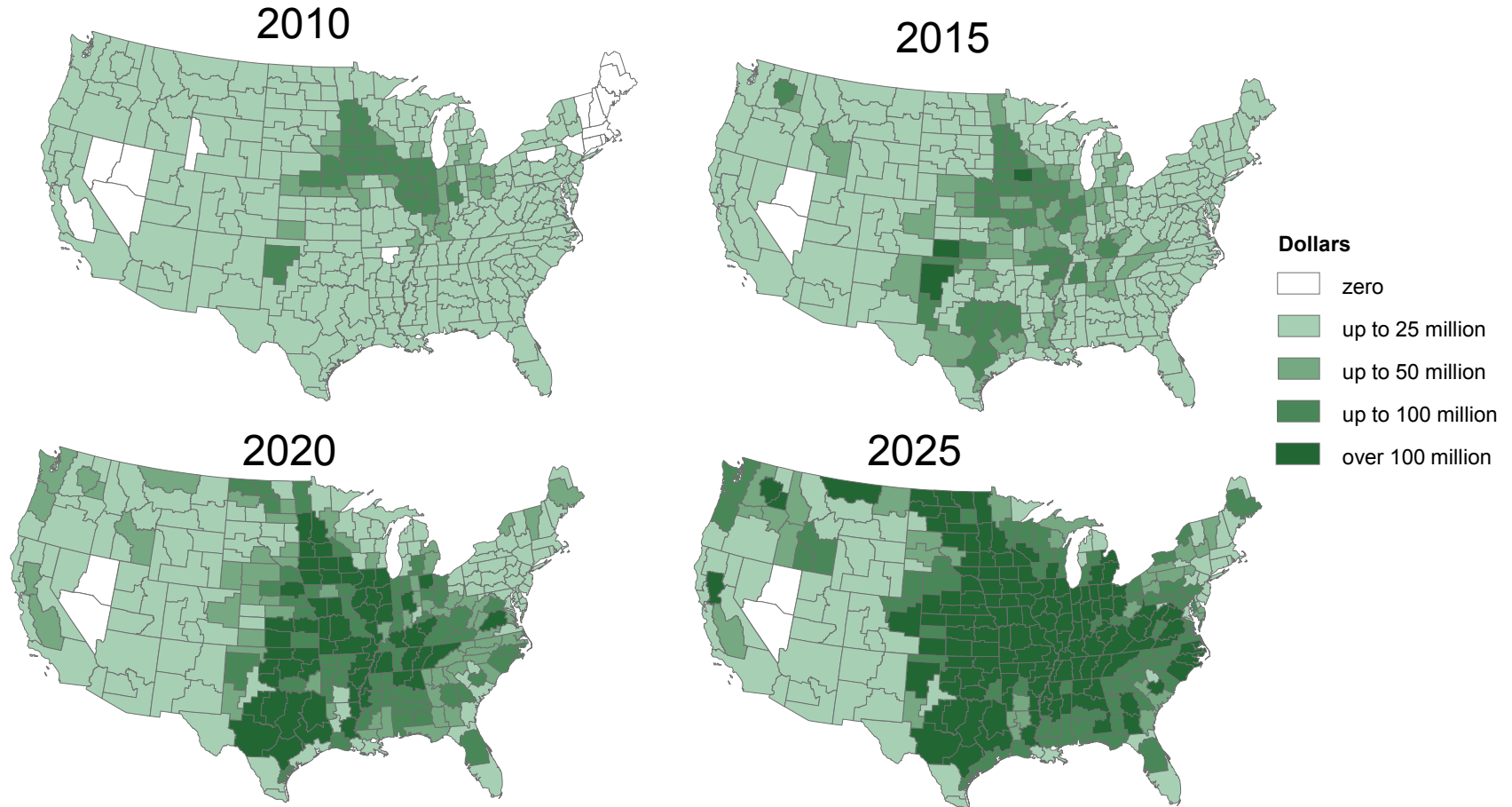
- Various components of the livestock industry react differently.
- The cattle sector is forecast to experience an increase in net returns.
- The hog and poultry industries are forecast to experience small decreases in net returns.
- The model is not fully capable of capturing the high degree of vertical integration in these industries---making market adjustment predictions difficult.



America's Energy Future

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Changes in Net Returns: **AE** Scenario





Impacts on National Economy in 2025

AE Scenario

- Economic Activity \$700 billion
- Jobs 5.1 million

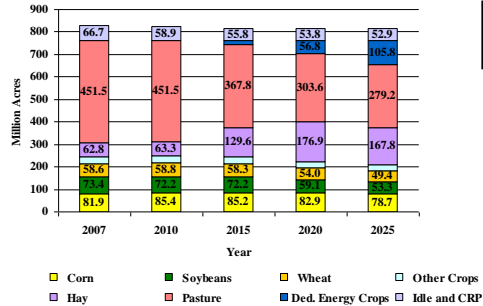


The 25x'25 Vision:

- Is achievable
- Provides a positive impact on the national and rural economies
- Reduces our reliance on foreign oil and improves national security
- Creates important environmental benefits



Further Investigation on the Forage Assumption



- While some row and close grown crop land is converted to dedicated energy crops, the majority of underutilized land with lower opportunity costs is pasture.
- Motivation for that statement came when Burton English first moved to Tennessee and was told by Extension that about 1/3 of the state's pasture lands were not needed to grow the existing herd.



Information Available

- NASS Crop Land Data Layer
 - Alfalfa
 - Fallow/idle cropland
 - Pasture/grass
 - Pasture/Hay
 - Other Hay/Non Alfalfa
- Extension Recommendations
 - Pasture production
 - Hay production
 - Cow/Calf forage requirements
- NASS hay yields and production information



Steps Taken

- Compare actual yield to yield Extension recommendations
 - Is $HAY_{acres} * HYIELD_{ext} - HAY_{prod} > 0$ if it is >0 then we have potential room for growth
 - Is $PASTAC > PAC_{percow} * COWINV$ if yes then we have surplus pastureland if managed as expected by Extension.



A Three State Example – Tennessee

1. TN – 2012 had 1 million cows on inventory as of Jan. 1.
2. TN cropland data layer (2012) indicates that there are 5.8 million acres in Alfalfa, Pasture/Grass, Pasture/Hay, and Other Hay categories
3. Between 2011-2012, average hay production was 3.6 million tons from 1.8 million acres with an average yield of 2 tons/acre. If you follow TN Extension recommendations, you should yield between 1.5 and 3.5 tons/acre.
4. Subtracting (items 3 from 2), TN has 4 million acres of Pasture. Extension recommends 1.5 acres/cow. Therefore multiplying 1 million cows times 1.5, we would need 1.5 million acres of pasture land maintained at Extension recommendations to meet TN herd forage requirements.
5. If Extension recommendations are followed in the management of beef and forage, 2.5 million acres of pastureland and 0.4 million acres of hay land are released.
6. Conclusion: We have underutilized forage lands in Tennessee.



A Three State Example – Alabama

1. AL – 2012 had 0.66 million cows on inventory as of Jan. 1.
2. AL cropland data layer (2012) indicates that there are 4.6 million acres in Alfalfa, Pasture/Grass, Pasture/Hay, and Other Hay categories
3. Between 2011-2012, average production was 2.1 million tons from 0.83 million acres with an average yield of 2.5 tons/acre. If you follow AL Extension recommendations, you should yield 4 tons/acre.
4. Subtracting (items 3 from 2), AL has 3.77 million acres of pasture. Extension recommends 1.8 acres/cow. Therefore multiplying 0.66 million cows times 1.8, we would need 1.2 million acres of pasture land maintained at Extension recommendations to meet AL herd forage requirements.
5. If Extension recommendations are followed in the management of beef and forage, 2.5 million acres of pastureland and 0.31 million acres of hay land are released.
6. Conclusion: We have underutilized forage lands in Alabama.



A Three State Example – Iowa

1. IA – 2012 had 1.1 million cows on inventory as of Jan. 1 (90% Beef/10% Dairy).
2. IA cropland data layer (2012) indicates that there are 1.28 million acres in Alfalfa, Pasture/Grass, Pasture/Hay, and Other Hay categories
3. Between 2011-2012, average production was 3.1 million tons from 1.14 million acres with an average yield of 2.5 tons/acre. If you follow IA Extension recommendations, you should yield between 4.0 tons/acre.
4. Subtracting (items 3 from 2), IA has 0.14 million acres of Pasture. Extension recommends 2.5 acres/cow. Therefore multiplying 1.1 million cows times 2.5, we would need 2.75 million acres of pasture land maintained at Extension recommendations to meet IA herd forage requirements. Hay is being substituted for pastureland in Iowa.
5. Conclusion: We have no additional forage lands available for conversion in Iowa.



Conclusion

- While not yet studied state by state, it appears that the forage assumption (1 acre hay land for every 2 acres of pastureland converted to dedicated energy crops) used in the 2006 25 x 25 study are conservative. There are areas where pasture land exists that if removed from forage supply will not impact the availability of forage and therefore beef production potential.
- A complete analysis needs to be done and an additional set of POLYSYS runs conducted using this new information.



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